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For: Air Flow Sensor

- 1 1. An air flow sensor comprising:
 - 2 a temperature dependent resistor device;
 - 3 a first circuit for applying a voltage to the temperature dependent resistor
 - 4 device until it reaches a first temperature, the first circuit including:
 - 5 a first reference resistance leg,
 - 6 a first variable resistance leg including the temperature dependent
 - 7 resistor device, and
 - 8 a first comparator connected to both legs for determining when the
 - 9 temperature dependent resistor-device reaches the first temperature;
 - 10 a second circuit including:
 - 11 a second reference resistance leg,
 - 12 a second variable resistance leg including the temperature dependent
 - 13 resistor device, and
 - 14 a second comparator connected to both legs for determining when
 - 15 the temperature dependent resistor device reaches a second
 - 16 temperature; and
 - 17 a processor connected to both the first and second comparators and
 - 18 programmed to time the period of time it takes the temperature dependent resistor device to
 - 19 change from the first temperature to the second temperature to determine the heat loss rate
 - 20 of the temperature dependent resistor device.

1 2. The air flow sensor of claim 1 in which the temperature dependent resistor
2 device is a thermistor.

1 3. The air flow sensor of claim 1 in which the first variable resistance leg
2 includes a low impedance resistor connected in series with the temperature dependent
3 resistor device and the first reference resistance leg includes a plurality of resistors
4 connected in series, the first reference resistance leg connected in parallel with the first
5 variable resistance leg.

1 4. The air flow sensor of claim 1 in which the second reference resistance leg
2 includes a plurality of resistors connected in series and the second variable resistance leg
3 includes a high impedance resistor connected in series with the temperature dependent
4 resistor device, the second reference resistance leg connected in parallel with the second
5 variable resistance leg.

1 5. The air flow sensor of claim 1 further including a first switch connected
2 between a voltage source and the first circuit, the processor programmed to close the first
3 switch until the temperature dependent resistor device reaches the first temperature and to
4 then open the first switch.

1 6. The air flow sensor of claim 1 further including a second switch connected
2 between a voltage source and the second circuit, the processor further programmed to
3 close the second switch after the temperature dependent resistor device reaches the first
4 temperature.

1 7. The air flow sensor of claim 1 further including an ambient temperature
2 sensing circuit including the temperature dependent resistor device.

1 8. The air flow sensor of claim 7 in which the ambient temperature sensing
2 circuit includes a reference resistor and a capacitor connected in series with the
3 temperature dependent resistor device.

1 9. The air flow sensor of claim 8 in which the processor is connected on a
2 first line between the reference resistor and the capacitor and on a second line between
3 the capacitor and the temperature dependent resistor device.

1 10. The air flow sensor of claim 9 in which the processor is programmed to
2 apply a voltage on the first line and to detect the voltage on the second line until it
3 reaches a predetermined level and to then apply a voltage on the second line and to detect
4 the voltage on the first line until it reaches the predetermined level.

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1 11. An air flow sensor comprising:
2 a temperature dependent resistor device;
3 means for applying a voltage to the temperature dependent resistor device
4 until it reaches a first temperature;
5 means for determining when the temperature dependent resistor device then
6 cools to a second, temperature; and
7 means for timing the period of time it takes the temperature dependent
8 device to change from the first temperature to the second temperature to determine the heat
9 loss rate of the temperature dependent resistor device.

1 12. The air flow sensor of claim 11 in which the means for applying a voltage
2 includes a first switch connected between a voltage source and a first circuit which
3 includes a comparator connected to a first reference resistance leg and a first variable
4 resistance leg including the temperature dependent resistor device, the comparator
5 providing an output signal when the resistance of the temperature dependent resistor
6 device causes the first circuit to balance.

1 13. The air flow sensor of claim 11 in which the means for determining
2 includes a second switch connected between a voltage source and a second circuit which
3 includes a comparator connected to a second reference resistance leg and a second
4 variable resistance leg including the temperature dependent resistor device, the
5 comparator providing an output signal when the resistance of the temperature dependent
6 resistor device causes the second circuit to balance.

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1 14. A method of determining the heat transfer rate of a temperature dependent
2 resistor device, the method comprising:
3 heating the temperature dependent resistor device to a first temperature;
4 allowing the temperature dependent resistor device to cool to a second
5 temperature;
6 measuring the period of time it takes for the temperature dependent resistor
7 device to cool to the second temperature; and
8 calculating the rate of heat transfer of the temperature dependent resistor
9 device based on the measured period of time.

1 15. The method of claim 14 in which the step of heating includes applying a
2 first voltage across the temperature dependent resistor device until it reaches a first
3 resistance value.

1 16. The method of claim 15 in which the step of allowing the temperature
2 dependent resistor device to cool includes applying a second, lower voltage across the
3 temperature dependent resistor device until it reaches a second resistance value.

1 17. The method of claim 14 in which the step of measuring includes
2 monitoring when the temperature dependent resistor device reaches the first resistance
3 value and timing the time period it takes to reach the second resistance value.